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MINERALOGY AND PETROGRAPHY.[1]

Petrographical News.—A most interesting rock is described by Osann[2] as forming the body of the hill known as Hoyazo, in the Spanish Province Almeria. The rock is an andesite consisting of a ground-mass of colorless glass containing small crystals of cordierite, flakes of biotite, lath-shaped microlites of plagioclase, and of an orthorhombic pyroxene, in which are porphyritic crystals of labradorite, a large quantity of biotite, columnar crystals of bronzite, hornblende, augite, and cordierite. The last-named mineral occurs in the form of irregular grains associated with quartz, and also in well-developed crystals, with a pleochroism: $A =$ yellowish-white; $B =$ dark violet; $C =$ light violet. In the rock are inclusions of quartz, of aggregates of quartz and cordierite, and of a biotite gneiss rich in cordierite and garnet. A portion of the cordierite, separated from the rock, was analyzed with this result:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	Sp. Gr.
48.58	32.44	3.15	9.17	tr	6.03	2.625–2.628

The mineral is usually fresh, but contains numerous inclusions of sillimanite, whose composition is: $Al_2O_3 = 63.52\,\%$, $SiO_2 = 35.43\,\%$. The granular cordierite is supposed to represent the remains of foreign inclusions in which the mineral was an original constituent. The crystallized variety is thought to have arisen from the solution of a portion of the inclusions and a subsequent re-separation of cordierite, as well-developed crystals. The author regards the same explanation as applicable to all the cases in which cordierite has been found in volcanic rocks, *i.e.*, it is a secondary mineral produced by the solution of foreign inclusions in the magma of the eruptive.——Lacroix[3] intends to make a complete study of pyroxene gneiss, and of rocks containing scapolite. He has published the first results of his work in a very excellent paper which is occupied with descriptions of the rocks of these two classes, together with the rocks associated with them as they are found in Brittany and in other parts of France, in Saxony, Austria, Spain, Algeria, Norway, Sweden, New York, Canada, Ceylon, India, and a few other places. As is to be expected, Lacroix finds many interesting facts connected with the structure, composition and genesis of these two little-known rock groups. He has discovered that the scapolite rocks are sometimes the result of contact phenomena in marbles. Sometimes they are the result of the alteration of gabbros, and sometimes they are original. In every case it is found that there is a tendency of the rock to possess as constituents one or more rare rock-forming minerals. As the writer has examined all these very carefully, his paper is a mine of wealth to the petrographer who has to deal with rare minerals. Among the most interesting observations described may be mentioned the existence of dumortierite and cordierite in a gneiss from Bamle, Norway; fuchsite in a mica-schist from Salem, India; and the new mineral fouquéite in a gneiss from the same vicinity. Original epidote and parallel growths of this mineral with allanite in a pyroxene gneiss from Morbihan, France, and in a scapolite gneiss from Odegården, Norway, are described, as are also the regular arrangement of rutile needles in phlogopite and garnet and micropegmatitic intergrowths of pyroxene and quartz (page 297), pyroxene and oligoclase (pp. 316–318), garnet and quartz (p. 317), and amphibole and oligoclase (p. 319). The varieties of feldspar known as sun-stone and esmarkite are referred to, the properties of the minerals of the scapolite group are discussed, and the occurrence of secondary and original wollastonite and wernerite is mentioned. Contact rims consisting of hypersthene and amphibole, and tremolite and amphibole, are pictured around olivine in olivine-gabbros, and a rim consisting of biotite and amphibole is figured as seen around ilmenite. In addition to the observations made by Lacroix, there are incorporated in the paper descriptions of the facts discovered by earlier workers in the domain of these rocks. It therefore becomes a valuable compendium of our knowledge of scapolite rocks, so far as known. In connection with his description of the New York rock, Lacroix gives an interesting account of the properties of the minerals found in the neighborhood of Pierrepont.——Mr. J. P. Iddings[4] has just published one of the most interesting papers that has yet appeared on the subject of lithophysæ. The article opens with a description of the macroscopic structure of the great mass of obsidian known as Obsidian Cliff, in the Yellowstone National Park. The most striking feature of the southern portion of the mass is its perfect columnar structure, with the columns all perpendicular to the surface over which the rock flowed. A petrographical description of the rock follows, and it is in this portion of his paper that the author shows well his ability to treat a complicated subject. Spherulites and lithophysæ are minutely

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] *Zeits. d. deutsch. geol. Gesells.*, XL., 1888, p. 694.

Bull. Soc. Franc. d. Min., XII., 1889, p. 83.

[4] Seventh Ann. Rep. Direct: U. S. Geol. Survey, p. 255

described, and very fine pictures of the structures are given. Without being able to enter into a full discussion of the points so clearly brought out by Mr. Iddings, it is interesting to note that he regards the lithophysæ as having been produced, after the partial solidification of the rock in which they occur, by the expansion of the vapors imprisoned within the rock-mass before its eruption. The formation of the minerals coating the walls of the cavities was caused by the action of this water upon the materials of the rock. The expansion of the vapors was due to the diminution of the pressure under which they were confined in consequence of the upward bending of the rock layers above the places now occupied by the lithophysæ. These conclusions are in direct opposition to those of Szabo, Roth, Zirkel, and Cole,[5] who regard lithophysæ as resulting from the alteration of spherulites.——A nephelinite composed of a granular aggregate of nepheline cementing porphyritic crystals of olivine, shreds of biotite, microlites of augite and magnetite, is announced by Levy and Callot[6] as existing in a boss near Rougiers in Var, France.

New Minerals.—*Tephrowillemite.*—Dr. Koenig[7] communicates the discovery of a brownish-gray, resinous, infusible substance at the Trotter Mine, Franklin, N. J. Only a portion of a single mineral was obtained, which yielded on analysis :

$SiO_2 = 27.75$, $ZnO = 60.61$, $MnO = 10.04$, $Fe_2O_3 = 1.80$, $CaO =$ tr.

It is a *manganese willemite* with the formula $(ZnMnFe)_2\ SiO_4$.——*De-Saulesite.*—Associated with the above-described mineral, and also with *sphalerite*, *chloanthite*, *fluorite*, *apatite* and *nicolite*, beneath a stratum of yellow garnet, at a depth of 340 feet from the surface, is a greenish substance encrusting fluorite and filling cavities in it. In the closed tube it yields water and turns brown. It is infusible before the blowpipe, but at this high temperature it regains its original color. Its composition is:

SiO_2	NiO	ZnO	FeO	CaO	MgO	As_2O_5	H_2O at 100°	H_2O at 600°
31.62	38.22	4.00	2.03	.70	.42	4.77	9.44	7.14

corresponding to $NiZnFe\ (SiO_3) + 1\frac{1}{2}$ Aq. It is therefore a *nickeliferous garnierite.*——*Yttrialite.*—From the gadolinite locality in Llano County, Texas, five miles south of Bluffton, Messrs. Hidden and Mackintosh[8] have discovered a very large number of new and rare yttria and thoria minerals associated with less rare compounds in the quartz veins cutting granite. Among the bodies new to mineralogy was found a yellowish substance in large masses with an olive-green color on a fresh fracture. Its specific gravity is 4.575, and its hardness 5–5.5. It is soluble in hydrochloric acid, decrepitates when heated, and breaks into an infusible and insoluble powder. Its composition is:

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[5] AMER. NATURALIST, Jan., 1887, p. 70.

[6] *Comptes Rendus*, 1889, p. 1124.

[7] *Proc. Acad. Nat. Sciences, Phila.*, Pt. II, 1889, p. 184.

[8] *Amer. Jour. Sci.*, Dec. 1889, p. 474.

SiO_2	PbO	ThO_2	MnO	FeO	CaO	Al_2O_3	Ce_2O_3	Y_2O_3	$(LaDi)_2O_3$	UO_3	Ign.
29.17	.854	12.00	.77	2.89	.60	.55	1.86	46.50	2.94	.83	.79.

——*Thorogummite* usually occurs in small pieces intimately associated with *fergusonite* and *cyrtolite*. It has a dull yellowish-brown color, a hardness of 4–4.5, and Sp. Gr. of 4.485. Occasionally groups of crystals with a ziron-like habit have been found. The mineral becomes of a dull greenish hue after ignition, and is soluble in nitric acid. Composition:

SiO_2	UO_3	ThO_2	Al_2O_3	Fe_2O_3	$(CeY)_2O_3$	PbO	CaO	H_2O	P_2O_5	Ign
13.085	22.43	41.44	.965	.845	6.69	2.16	.41	7.88	1.19	1.23

corresponding to $UO_6\,(ThOSi)_3$, $(OH)_{12}$, or *gummite* in which the water has been replaced by thorite.——*Metagadolinite* is a grayish brown amorphus alteration product of gadolinite from the above mentioned locality. It has a red streak, a hardness of 3, and a specific weight of 3.494. Mr. Goldsmith [9] has made an approximate analysis of it, and regards it as a new mineral.[10] His result is:

SiO_2	YO(?)	Ce_3O_4(?)	Fe_2O_3	CaO	MgO	H_2O
18.145	21.854	20.662	26.026	3.642	2.14	9.761

——*Daviesite*.—Associated with other decomposition products of lead ores at Minas Beatriz, Sierra Gordo, Chili, Mr. Fletcher [11] discovered tiny, colorless, prismatic crystals of an orthorhombic mineral, with an axial ratio 1.2594 : 1 : .6018, and the plane of its optical axes parallel to $\infty P\bar{\infty}$. From the few chemical tests made upon the small amount of material at his command, Fletcher supposes the mineral to be an oxychloride of lead.——*Dudgeonite* [12] was found at the Pibble Mine, near Creetown, Scotland, in little cavities occurring in *nickeline*. It a grayish-white earthy substance, with a slightly resinous lustre. Its hardness is 3–3.5. In composition it corresponds to *annabergite*, with one-third of the nickel replaced by calcium $(\frac{2}{3}NiO, \frac{1}{3} CaO)_3 As_2O_5 + 8 H_2O$. [$NiO=25.01$, $CoO=.76$, $CaO=9.32$, $As_2O_3=39.33$, $H_2O=25.01$].——*Hydroplumbite* and *Plumbonacrite*.—The former mineral is in very small scaly crystals, with a pearly lustre, forming thin flakes of a pure white color, covering all the lead minerals of a specimen of associated lead ores, that probably came from Leadhills, Scotland. The amount of the new mineral obtained was too small for analysis; but from the synthesis of a similar substance, Heddle[13] infers that its composition is $3PbO\ H_2O$. The second mineral (from Wanlockhead) resembles *hydroplumbite* in appearance, but yields upon analysis a result corresponding to the formula $PbCO_3 + 3\ PbO\ H_2O$ [$PbO=92.85$, $CO_2=4.76$, $H_2O=2.01$, residue$=.78$].——*Flinkite* is described by Hamberg[14] from Pajsberg, Sweden. It occurs in greenish-brown tabular orthorhombic crystals, with a hardness of 4.5, and Sp. Gr $=3.87$. Its composition is:

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[9] *Proc. Acad. Nat. Sci. Phila.* Pt. II., 1889, p. 164.

[10] Cf. F. A. Genth. *Amer. Jour. Sci.*, Sept. 1889., pp. 198–200.

[11] *Miner. Mag.*, VIII., May, 1889, p. 171.

[12] Heddle: *Miner. Mag.*, May, 1889, p. 200.

As_2O_5	Sb_2O_5	Mn_2O_3	Fe_2O_3	MnO	CaO	MgO	H_2O
29.1	2.5	20.2	1.5	35.8	.4	1.7	9.9

——*Fouqueïte*.—In his excellent paper on scapolite rocks, Lacroix[15] describes a dimorphous form of zoisite occurring as a constituent in an anorthite gneiss from the District of Salem, Madras, India. The new mineral is found in corroded and rounded monoclinic crystals, elongated in the direction of their *c* axes, and polysynthetically twined with the orthopinacoid as the composition face of the various lamellæ. They possess a well-marked cleavage parallel to the face assumed as the basal plane, which makes an angle of 108° with $\infty P\bar{\infty}$. The plane of their optical axes is oP, and the optical angle 2V is about 90°, with *b* as the positive acute bisectrix. The pleochroism is weak in yellow tints. The mineral is infusible before the blowpipe, and has a specific gravity of 3.24–3.31. It occurs in two varieties, the compositions of which are as follows:

	SiO_2	Al_2O_3	FeO	CaO	Loss.
Colorless:	36.6	32.5	1.9	23.9	2.7
Yellow:	38.3	31.9	4.4	23.5	2.7

——*Pleonektite* occurs with *arseniopleite* in the gangue of the manganese mine, Sjögrufvan, Grythyttan Parish, Örebro, Sweden. It is a light gray mineral,[16] with a hardness of 4, and a metallic fatty lustre. It is transparent in thin splinters. Before the blowpipe it decrepitates, but does not fuse. On charcoal it gives the reactions for lead, antimony, arsenic, traces of manganese and water. It is probably a lead antimony arseniate resembling *hedyphane*.——*Anthocroite*.—When the ore from the Jakobsberg braunite mine is treated with hydrochloric acid, there is left as a residue a violet sand composed of little grains of a mineral that occurs scattered throughout the ore as well as throughout all the minerals associated with the ore, and in veins cutting the surrounding limestone. The largest masses of the mineral are in a magnese *vesuvianite*, and from this it can be obtained in a pure form. Lumps of the new mineral[17] consist of small transparent grains of a light amethyst color, and a hardness of 5–6. It is biaxial, with an optical angle (in air) of about 100°. Its analysis shows it to be a bisilicate with the composition :

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[13] Ib., p. 201.

[14] Geol. För. Förh., XI., 1889, p. 212.

[15] Bull. Soc. Franç de Min., 1889, p. 327.

[16] Ingelström: *Neues Jahrb. f. Min.*, etc., 1889, II., p. 40.

SiO_2	MnO	CaO	MgO	$Al_2O_3 . Fe_2O_3$	$K_2O.Na_2O$
51.6	3.4	23.3	13.5	1.4	6.8

——*Michel-lévyite* is the monoclinic form of barium sulphate, of which *barite* is the orthorhombic form. It was discovered by Lacroix[18] in the crystallized limestone of Templeton, Canada. It is a flaky, white substance, with three cleavages. These are assumed as the three pinacoids, giving 77°–78° as the value of β. The plane of the optical axes is perpendicular to $\infty P\bar{\infty}$, and the value of the optical angle is nearly 90° The principal bisectrix probably coincides with the axis *b*. Specific gravity=4.39.——*Messelite* is found in aggregates of colorless or brown tabular crystals in a clay slate at Messel, a station on the railroad between Darmstadt and Aschaffenberg, Hessen. The crystals[19] are monoclinic, with an extinction of 20° on the clinopinacoid. Their average percentage composition corresponds to the formula $(Ca\,Fe\,Mg)_3\,(PO_4)_2 + 2\frac{1}{2}H_2O$.——*Wiluite* is the name given by *Prendel*[20] to a variety of *vesuvianite* from Wilui, Russia. Its composition is:

SiO_2	TiO_2	Al_2O_3	CaO	MgO	$Fe_2O_3.FeO$	MnO	Alk	Loss
38.30	1.09	13.07	35.92	5.83	4.25	tr.	.37	.96

Crystals cut parallel to a prismatic face show the hour-glass structure in which the two constituent substances have different refractive indices. In sections parallel to the base the inner substances show a biaxial interference figure with an optical angle of 3°–4°, while in the exterior zone the axial angle is 30°–35°. In both substances the axial figure is decreased by heating. Their hardness is above .7, and their specific gravity, 3.331. Their conductivity for heat is greatest in the direction of the *c* axis.——Three new *cupro-descloizites* are described and analyzed by Hillebrand.[21] The first occurs massive in the Mayflower Mine, Beaverhead county, Montana, in lumps of a dull yellow to pale orange color. The second is found as thick botryoidal incrustations in quartz, with a dull green color on the surface, and a brown color on a fresh fracture. It is found at the Lucky Cuss Mine, Tombstone, Arizona. The third came from the Commercial Mine, Georgetown, New Mexico, where it also is found as an incrustation on *quartz*. It varies in color from yellow through all shades of orange red to deep reddish-brown. The incrustations are distinctly crystalline, being made up of globular masses composed of little flat crystals crowded close together. At other times the incrustation is acicular in shape, when it appears to have formed on bunches of radiating *vanadinite* needles. The composition of this variety is:

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[17] Ib., p. 36.

[18] *Comptes Rendus*, CVIII., 1889, p. 1126.

[19] Muthman: *Zeits. f. Kryst.*, XVII., 1889, p. 93.

[20] Ib., p. 94.

PbO	CuO	FeO	ZnO	V_2O_5	As_2O_5	P_2O_5	H_2O	Cl	SiO_2	CaO	MgO
56.01	1.05	.07	17.73	20.44	.94	.26	2.45	.04	1.01	.04	.03

BOTANY.

Uredinial Parasites.—From a practical standpoint as well as from a biological, uredinial parasites are exceedingly interesting. A specimen, or specimens rather, found in Dawes County, Nebraska, this summer (July 20), deserve, I think, special mention. An Æcidium on *Lygodesmia juncea* Don. (Æcidium compositarum Mart. var. lygodesmiæ Webber), was found very commonly. It was very destructive, frequently distorting whole plants, and, by partially stopping the growth above, giving them a somewhat depressed much branched appearance.

The avenger, however, was close at hand, entirely too close for the good of the Æcidium. Not in the form of man, with his multifarious external poison applications, but simply another little parasite on this parasite, wreaking vengence. It was the little *Tuberculina persicina* (Ditm.) Sacc., a plant closely allied to the smuts, found very rarely in

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[21] *Amer. Jour. Sci.*, June, 1889, p. 434.